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FSTRAC Newsletter

FEDERAL-STATE TOXICOLOGY RISK ANALYSIS COMMITTEE

What Is FSTRAC?

In 1985, Drs. Joseph Cotruvo, Edward Ohanian, and Penny Fenner-Crisp of the U.S. Environmental Protection Agency's (EPA's) Office of Science and Technology, Health and Ecological Criteria Division, started FSTRAC to build a better relationship with states and tribes to exchange research priorities and results, policy concerns regarding water-related human health risk assessment, and technical information. FSTRAC is made up of representatives from state and tribal health and environmental agencies and EPA Headquarters and Regional personnel. As described on the EPA FSTRAC Web page (**http://www2.epa.gov/water-research/basic-information-fstrac**), FSTRAC is an integral part of EPA's communication strategy with states and tribes. FSTRAC fosters cooperation, consistency, and an understanding of EPA's and different states' and tribe's goals and problems in human health risk assessment. It allows states, tribes and the federal government to work together on issues related to the development and implementation of regulations and criteria under the Safe Drinking Water Act and Clean Water Act.

Recent Webinars

FSTRAC holds several Webinars each year to share information through presentations and discussions regarding human health risk analysis and the water medium of exposure.

April 2015 FSTRAC Webinar

EPA held a FSTRAC Webinar in April 2015 during which the following topics were discussed:

Update on Criteria Development (presented by Ms. Elizabeth [Betsy] Behl, OW/EPA): Ms. Behl provided an overview of EPA Office of Science and Technology, Health and Ecological Criteria Division's new addition to the management team, as well as staff changes, 2014 accomplishments, and 2015 work plan. Ms. Behl provided details about the 2014 accomplishments for human health (e.g., completed peer review of perfluorooctanoic acid [PFOA] and perfluorooctane sulfonate (PFOS) draft health effects documents; issued updated draft human health criteria for 94 chemicals for which public comments were received for 90-days, started bacteriophage criteria development), aquatic life criteria (e.g., selenium public comments and peer review, Endangered Species Act work, metals, flow and plastics white papers), and nutrients (e.g., numeric nutrient criteria workshops in 10 regions, U.S. EPA Expert Workshop Proceedings for nutrient enrichment indicators in streams, relationships between nutrients and harmful algal blooms). She also discussed 2015 priorities for human health (e.g., updated human health criteria for 94 chemicals, Health Advisories for microcystin and cylindrospermopsin), aquatic life criteria (e.g., selenium criteria, flow white paper), and nutrients (e.g., webinars on numeric nutrient criteria, updated fact sheet on support for dual nutrient criteria approach).

Strontium Health Effects (presented by Joyce Donohue, OW/EPA): Dr. Donohue discussed strontium health effects, including detailed information on toxicokinetics. She

The purpose of this newsletter is to keep Federal-State Toxicology and Risk Analysis Committee (FSTRAC) members up-to-date on current developments in toxicology, risk analysis, and water quality criteria and standards. This newsletter also provides information on recent FSTRAC webinars and upcoming events. Please share this newsletter with anyone you think might be interested in these topics. If you are interested in joining FSTRAC, please contact the FSTRAC Chair, Dr. Shamima Akhter (**Akhter.Shamima@epa.gov**).

discussed an epidemiology study of increased rickets performed in Turkey and another study performed for staining of tooth enamel in Wisconsin. Dr. Donohue presented animal data from critical studies and described how the study used to develop the 2014 EPA Office of Water value (i.e., Marie et al. 1985) differed from the study which was used to develop the 1992 EPA Integrated Risk Information System (IRIS) value (Storey 1961). She presented the existing Unregulated Contaminant Monitoring Rule 3 (UCMR3) monitoring data for strontium in ground water and surface water and noted that only 39 percent of all systems have submitted complete results. Dr. Donohue noted that next steps include waiting for the completion of UCMR monitoring and analysis of the data, collecting the data needed to establish the relative source contribution, and evaluating treatment options for efficacy and costs.

Contaminants of Emerging Concern in Source and Treated Drinking Water (presented by Susan Glassmeyer, ORD/EPA): Dr. Glassmeyer provided information on contaminants of emerging concern (CECs) and their relationship to the water cycle. She also presented information on her current research on CECs in source and treated drinking water, including frequency of occurrence of CECs, concentration ranges, interesting anecdotes, and health implications. She noted that paired source and treated drinking water samples from 25 locations were analyzed for 247 chemical and microbial constituents. Dr. Glassmeyer mentioned that out of the 247 analytes measured, 99 were never detected in the source water samples and 127 were never detected in the treated drinking water samples. She noted that most of the concentrations of detected organic chemicals were <10 ng/L. She further noted that the numbers of pharmaceuticals and anthropogenic waste indicators qualitatively measured in samples was quite variable, while the perfluorinated compounds and inorganics varied little.

West Virginia American Water's Response to Freedom Industries Chemical Spill (presented by Jeffrey McIntyre, West Virginia American Water): Mr. McIntyre presented information on West Virginia American Water's Response to the Freedom Industries chemical spill. He noted that on January 9, 2014, an undetermined amount of 4-methylcyclohexanemethanol (MCHM) leaked into the Elk River from a storage tank at a facility owned by Freedom Industries. West Virginia American Water was informed of the spill by the West Virginia Department of Environmental Protection. Mr. McIntrye noted that an interagency team of federal and state agencies, as well as Kanawha County, was assembled to manage the spill response. He mentioned that they sampled, tested, and flushed the system until MCHM and its associated odor were no longer detected in the samples.

Information from States Developing Guidance for Specific Chemicals

Criteria Values

Minnesota Department of Health

The Minnesota Department of Health's Contaminants of Emerging Concern program recently published health-based water guidance for *p*-nonylphenol (Toxicological Summary [http://www.health.state.mn.us/divs/eh/risk/guidance/gw/nonylphsumm.pdf] and Info Sheet [http://www.health.state.mn.us/divs/eh/risk/guidance/gw/nonylphinfo.pdf]). Nonylphenol and related compounds have been detected recently in waters that could be used as drinking water sources in Minnesota, and toxicological criteria for what these levels could mean regarding health effects were lacking. A major focus of the Contaminants of Emerging Concern program, beyond evaluating chemical toxicity for water guidance development, is to effectively communicate in plain language to a wide audience the "so what" message following a chemical review. Based on occurrence information gathered in water sources thus far, the levels present are not expected to cause harm. Overall, the review of nonylphenol presented many challenges and opportunities related to evaluation of a chemical

which exists as a complex mixture with over 200 potential isomers, and incorporation of benchmark dose analysis into our review process.

California Environmental Protection Agency

In February 2015 the Office of Environmental Health Hazard Assessment (OEHHA) published an updated public health goal (PHG) of 1 part-per-billion (ppb) for perchlorate in drinking water. The new goal updates the previous PHG for perchlorate, which was set at 6 ppb in 2004. A PHG is not an enforceable regulatory standard. Its purpose is to provide scientific guidance to the State Water Resources Control Board's Division of Drinking Water in reviewing the existing state drinking water standard, or maximum contaminant level (MCL), which is set at 6 ppb for perchlorate. There is no current federal standard for perchlorate in drinking water. The updated PHG is lower than the previous goal because it incorporates new research about the effects of perchlorate on infants and incorporates new data on how much water infants consume per kilogram of body weight. It also considers infants' intake of perchlorate from infant formula reconstituted with tap water. Like the previous PHG, the updated PHG takes into account exposure from all sources of perchlorate including food. The lowering of the PHG does not suggest any food is unsafe or that the public should change its dietary habits.

In developing the PHG for perchlorate, OEHHA's approach to determine an acceptable daily dose that serves as the basis for the PHG followed that used by the National Academy of Sciences[1] to develop its reference dose in several key areas:

1. Both OEHHA and NAS identified the human study by Greer and colleagues[2] as the critical study for evaluating the effects of perchlorate.
2. Both OEHHA and NAS chose iodide uptake inhibition in the Greer et al. study as the key effect on which to base their calculations.
3. Both OEHHA and NAS noted that the subjects in the Greer et al. study were healthy adults and concluded that some people may be more susceptible to perchlorate than these healthy adult subjects. For this reason, both OEHHA and NAS applied an uncertainty factor of 10 to calculate a dose that would address inter-individual variability among humans and be protective of those who are likely to be sensitive to the effects of perchlorate.
4. Both OEHHA and NAS identified the same populations likely to be more sensitive to perchlorate exposure: fetuses, preterm newborns, infants, developing children, pregnant women, people who have compromised thyroid function resulting from conditions that reduce thyroid hormone production, and people who are iodine-deficient.

There is only one substantive difference between the OEHHA and NAS analyses to determine an acceptable daily dose (reference dose in NAS parlance). The NAS used the no-observed-effect level (NOEL) approach. They determined that the NOEL was 0.007 mg/kg-day, the highest dose in the Greer et al. study that was not associated with a statistically significant response. OEHHA used the Benchmark Dose (BMD) approach and calculated a point of departure of 0.0037 mg/kg-day. The BMD method is a statistical method that is now widely recognized as a better approach because it incorporates more dose-response information from the study than the NOEL method.[3, 4]

Technical Information

The New Jersey Drinking Water Quality Institute (DWQI), a legislatively established advisory body to the New Jersey Department of Environmental

1 NAS. 2005. Health Implications of Perchlorate Ingestion. Committee to Assess the Health Implications of Perchlorate Ingestion, National Research Council, Washington, DC: National Academy of Sciences. http://www.nap.edu/catalog.php?record_id=11202#toc

2 Greer M.A., G. Goodman, R.C. Pleus, and S.E. Greer. 2002. Health effects assessment for environmental perchlorate contamination: the dose response for inhibition of thyroidal radioiodine uptake in humans. *Environ Health Perspect* 110(9):927-937.

3 NAS. 2009. Science and Decisions: Advancing Risk Assessment. Committee on Improving Risk Assessment Practices Used by the U.S. EPA. National Research Council, Washington, DC: National Academy of Sciences. http://www.nap.edu/catalog.php?record_id=12209

4 U.S. EPA. 2012. Benchmark Dose Technical Guidance. Accessed at: http://www.epa.gov/raf/publications/benchmarkdose.htm

Protection (NJDEP), has finalized a recommendation to the Commissioner of NJDEP of an MCL for perfluorononanoic acid (PFNA) of 0.013 µg/L (13 ng/L). The recommendation is supported by technical documents on health effects/risk assessment, analytical limitation (Practical Quantitation Level; PQL), and drinking water treatment removal. The recommendation and supporting technical documents are posted on the DWQI website at http://www.nj.gov/dep/watersupply/g_boards_dwqi.html under the heading Recommendations for Maximum Contaminant Levels.

Risk Assessment Issues

Drinking Water

EPA Has Published Health Advisories and Technical Support Documents for the Cyanobacterial Toxins

EPA posted drinking water health advisories (HAs) for the cyanobacterial toxins, microcystins and cylindrospermopsin. The advisories describe concentrations of the two algal toxins in drinking water at or below which adverse human health effects are not anticipated to occur over a ten-day exposure period. Based on the reported occurrence, toxicology, and epidemiology data, EPA found there were adequate data to develop HAs for microcystins and cylindrospermopsin, but inadequate data to develop an HA for anatoxin-a.

EPA also released Health Effects Support Documents (HESDs) for three cyanobacterial toxins of concern: microcystins, cylindrospermopsin, and anatoxin-a. These three cyanotoxins were identified on EPA's most recent Candidate Contaminant List for potential regulation in drinking water. HESDs describe the health effects basis for the development of HAs. These cyanotoxin HESDs were also designed to provide information and a framework that public water systems and others can consider using to inform their decisions on managing risks from cyanotoxins to drinking water.

For more information on the two cyanobacterial toxin health advisories, including the health effects support documents, visit EPA's health advisory website: http://water.epa.gov/drink/standards/hascience.cfm

For more information on the support document for managing cyanotoxins in drinking water, visit EPA's CyanoHABs website: http://www2.epa.gov/nutrient-policy-data/guidelines-and-recommendations

Clean Water

Human Health Ambient Water Quality Criteria: 2015 Update

EPA published final updated ambient water quality criteria for the protection of human health for 94 chemical pollutants. These updated recommendations reflect the latest scientific information and EPA policies, including updated body weight, drinking water consumption rate, fish consumption rate, bioaccumulation factors, health toxicity values, and relative source contributions. EPA accepted written scientific views from the public from May to August 2014 on the draft updated human health criteria and has published responses to those comments. EPA water quality criteria serve as recommendations to states and tribes authorized to establish water quality standards under the Clean Water Act.

For more information on EPA's Human Health Ambient Water Quality Criteria 2015 update, visit: http://water.epa.gov/scitech/swguidance/standards/criteria/current/loader.cfm?csModule=security/getfile&PageID=717763

Draft Aquatic Life Chronic Criterion for Selenium in Freshwater

In July 2015, EPA released a draft updated national recommended aquatic life criterion for the pollutant selenium. The public is able to provide scientific views on the draft document until **September 25, 2015**. The draft criterion document is a revision of EPA's 2014 External Peer Review Draft Freshwater chronic aquatic life criterion for selenium. It reflects the latest scientific information, which indicates that selenium toxicity to aquatic life is primarily driven by organisms consuming selenium-contaminated food rather than by direct exposure to selenium dissolved in water.

The draft criterion has four parts, including two fish tissue-based and two water column-based elements.

Once finalized, EPA's water quality criterion for selenium will provide recommendations to states and tribes authorized to establish water quality standards under the Clean Water Act.

For more information on EPA's water quality criterion for selenium, visit http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/selenium/

Drinking Water Contaminant Occurrence Information

Unregulated Contaminant Monitoring Rule

EPA uses the Unregulated Contaminant Monitoring Rule (UCMR) program to collect data for contaminants suspected to be present in drinking water, but that do not have health-based standards set under the Safe Drinking Water Act (SDWA). Every five years EPA develops a new list of UCMR contaminants, largely based on the Contaminant Candidate List (CCL).

The third Unregulated Contaminant Monitoring Rule (UCMR 3) was published in the Federal Register on May 2, 2012. UCMR 3 requires monitoring for 30 contaminants: 28 chemicals and 2 viruses. The latest UCMR 3 data summary, reflecting results reported through June 1, 2015, was posted to http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/data.cfm#ucmr2013.

This dataset represents the seventh release of analytical results for UCMR3. Updates occur approximately quarterly and EPA anticipates that additional reference material will be made available to assist with the assessment of the UCMR 3 data. Please keep in mind that this dataset is not complete. UCMR 3 monitoring occurs through December 2015, and data are expected to be reported to EPA through the summer of 2016. These results are subject to change following further review by the analytical laboratory, the public water system, the State and EPA.

Treatability Issues for Contaminants

New Jersey Drinking Water Quality Institute

The New Jersey Drinking Water Quality Institute (NJDWQI) is an advisory body to the New Jersey Department of Environmental Protection (NJDEP). Membership includes drinking water purveyors, representatives from academia, and the members of the public with environmental health background, as well as scientists from NJDEP and the NJ Department of Health.

The NJDWQI Treatment Subcommittee recently developed a *Recommendation on Perfluorinated Compound Treatment Options for Drinking Water*[5]. In this document, the NJDWQI Treatment Subcommittee noted that according to published literature, long-chain perfluorinated compounds (PFCs), such as perfluorononanoic acid (PFNA), perfluorooctanoic acid (PFOA), and perfluorooctanesulfonic acid (PFOS), can be successfully removed using treatment techniques, such as activated carbon, membrane filtration, anion exchange, and advanced oxidation. These treatment techniques are described in further detail in the *Recommendation on Perfluorinated Compound Treatment Options for Drinking Water* document. It was noted that these treatment techniques might not be effective in removing all PFCs; for example, short-chain PFCs are not effectively removed by some of these techniques.

5 New Jersey Drinking Water Quality Institute (NJDWQI) Treatment Subcommittee. 2015. *Recommendation on Perfluorinated Compound Treatment Options for Drinking Water.* New Jersey Drinking Water Quality Institute Treatment Subcommittee, New Jersey. http://www.nj.gov/dep/watersupply/pdf/pfna-pfc-treatment.pdf

The NJDWQI Treatment Subcommittee noted that several factors[6] should be evaluated when selecting appropriate treatment option(s), including initial concentration of PFCs, the background organic and metal concentration, and available detention time and other site-specific conditions. Additional factors include operation and maintenance costs, the ability to address more than one contaminant with one treatment option, and waste disposal. To select the most cost effective treatment process(es), a case-by-case evaluation (i.e., bench and/or pilot-scale studies) is required. The NJDWQI treatment subcommittee recommends that bench and/or pilot studies should be designed to aid in the establishment of the required design parameters specific to the treatment processes being evaluated. The NJDWQI treatment subcommittee further noted that conceptual level design should be used to develop reasonable cost estimates for a full life-cycle cost analysis to include capital, operation and maintenance costs. The full life-cycle cost analysis can be utilized to define the best option specific to an individual water system.

The NJDWQI Treatment Subcommittee found that the ability of several treatment options to remove PFNA, PFOA, or PFOS is not expected to be a limiting factor in the development of a recommended New Jersey Maximum Contaminant Level for PFNA, PFOA, and PFOS.

Publications Pertinent to Drinking Water Issues

Murphy, E.A., G.B. Post, B.T. Buckley, R.L. Lippincott, and M.G. Robson. 2012. Future challenges to protecting public health from drinking water contaminants. *Annu. Rev. Publ. Health* 33:209–224.

Post, G.B., P.D. Cohn, and K.R. Cooper. 2012. Perfluorooctanoic acid (PFOA), an emerging drinking water contaminant: a critical review of recent literature. *Environ. Res.* 116:93–117.

Post, G.B., J.B. Louis, K.R. Cooper, B.J. Boros-Russo, and R.L. Lippincott. 2009. Occurrence and potential significance of perfluorooctanoic acid (PFOA) detected in New Jersey public drinking water systems. *Environ. Sci. Technol.* 43:4547–4554.

Post, G.B., J.B. Louis, R.L. Lippincott, and N.A. Procopio. 2013. Occurrence of perfluorinated chemicals in raw water from New Jersey public drinking water systems. *Environ. Sci. Technol.* 47(23):13266–13275.

Villanueva C.M., M. Kogevinas, S. Cordier, M.R. Templeton, R. Vermeulen, J.R. Nuckols, M.J. Nieuwenhuijsen, and P. Levallois. 2014. Assessing exposure and health consequences of chemicals in drinking water: current state of knowledge and research needs. *Environ Health Perspect.* 122:213–221.

Upcoming Events and Conferences

EPA IRIS Epigenetics and Cumulative Risk Assessment Workshop

EPA IRIS will be holding a workshop on Epigenetics and Cumulative Risk Assessment on September 2–3, 2015, at the EPA Conference Center at 2777 South Crystal Drive, Arlington, Virginia. The workshop will also be available by webinar/teleconference. Additional information is provided on the workshop website: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=308271

Fall 2015 FSTRAC Webinar

The fall FSTRAC Webinar (http://www2.epa.gov/water-research/upcoming-activities-fstrac) is

6 U.S. Environmental Protection Agency. 2014. *Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA).* U.S. Environmental Protection Agency, Solid Waste and Emergency Response, Potomac Yards, Arlington, Virginia. http://www2.epa.gov/sites/production/files/2014-04/documents/factsheet_contaminant_pfos_pfoa_march2014.pdf

scheduled for Wednesday, September 9, 2015, from 12:00 to 2:30 p.m., Eastern time. Below is the draft agenda for the webinar, with tentative timeframes (note that the presentation times might change slightly from the times provided below during the actual webinar).

1. EPA Office of Water/Office of Science and Technology Updates – Betsy Behl, Office of Water, USEPA (12:00–12:15 p.m.)

2. EPA's Draft Health Effects Documents for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) – Joyce Donohue, Office of Water, USEPA (12:15–12:45 p.m.)

3. Derivation of Methodology and Screening Water Concentrations for ~120 Pharmaceuticals – Ashley Suchomel, Minnesota Department of Health (12:45–1:15 p.m.)

4. EPA Health Advisories to Protect Americans from Algal Toxins in Drinking Water – Lesley D'Anglada, Office of Water, USEPA (1:15–1:45 p.m.)

5. A Cross-Sectional Study on Low-Level Exposure to Manganese from Drinking Water in New Brunswick and Children's Neurobehavioral Function – Maryse Bouchard, University of Montreal (1:45–2:15 p.m.)

6. State Hot Topics (2:15–2:30 p.m.)

If you are interested in joining the mailing list for FSTRAC to receive information about the FSTRAC Webinars and other relevant information, please contact the contractor for EPA's FSTRAC meetings (susan.lanberg@tetratech.com).

Invited Expert Meeting on Revising U.S. EPA's Guidelines for Deriving Aquatic Life Criteria

U.S. EPA, Office of Water, Office of Science and Technology is hosting an invited expert meeting to gather information regarding the state of the science for ecological risk assessment as it pertains to revising the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, Stephan et al. 1985) used to derive National Ambient Water Quality Criteria for the protection of aquatic life. EPA will consider information presented regarding new and alternative methods for deriving aquatic life criteria to inform revision of EPA's existing guidance using the newest, most appropriate science available. The meeting will be held on Monday, September 14–Wednesday, September 16, 2015, at the Crystal Gateway Marriott, 1700 Jefferson Davis Highway Arlington, VA 22202.

To reserve a seat for this meeting, click on the following link: https://www.eventbrite.com/e/invited-expert-meeting-on-revising-us-epas-guidelines-for-deriving-aquatic-life-criteria-tickets-16122090607

The meeting agenda and abstracts from invited experts are provided on the meeting website: http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/guidelines.cfm

The Ambient Water Quality Criteria for Coliphage – 2015 Stakeholder Webinar

EPA will provide an update on the development of Ambient Water Quality Criteria (AWQC) for coliphage, a viral indicator, via a webinar on Thursday, October 15, 2015 from 2:00–3:00 p.m. The link to the coliphage webinar site is https://epa.connectsolutions.com/coliphage/. This public webinar event is designed to be a forum for interested stakeholders to ask questions about the development of EPA's AWQC for coliphage and to provide topics/science questions for consideration in the upcoming Experts Science Workshop.

SETAC North America Annual Meeting

SETAC will be holding its annual North America meeting on November 1–5, 2015, in Salt Lake City, Utah. Additional information is provided on the SETAC Website: http://www.setac.org/?page=AnnualMeetings

Additional EPA IRIS Upcoming Events

Additional EPA IRIS upcoming public workshops on issues in risk assessment include:

- Advancing Systematic Review – December 16–17, 2015
- Temporal Exposure Issues for Environmental Pollutants: Health Effects and Methodologies for Estimating Risk – January 27–29, 2016
- Characterizing and Communicating Uncertainty in Human Health Risk Assessment – Early 2016

Additional information is provided on the IRIS workshop website: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=307738

SOT, 55th Annual Meeting

SOT will be holding its 55th annual meeting on March 13–17, 2016, in New Orleans, Louisiana. Additional information is provided on the SOT Website: http://www.toxicology.org/events/am/am2016/registration.asp#